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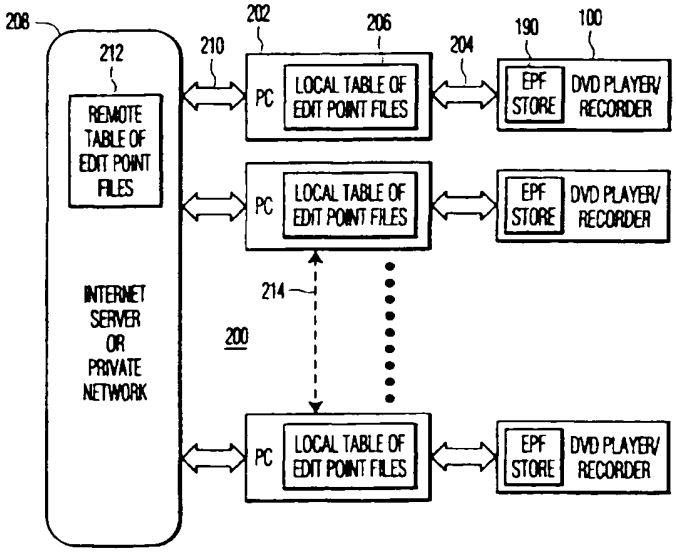
(54) Title: EDITING AND SHARING SYSTEM FOR REWRITABLE DISK MEDIA



(57) Abstract: A system and a method for presenting a program included in digital video data in accordance with edit information associated with the program. The edit information is stored in a publicly accessible storage medium, such as a server connected to the internet, or a medium coupled to a private network including a digital home network. The edit information, comprising edit point files, can be created and edited by various entities including individual consumers or ratings groups, and uploaded to the publicly accessible storage medium or the medium coupled to a private network, and then downloaded as desired. Such an arrangement allows a user to share edit information with others connected to the network as well as view programs in accordance with previously created edit information.

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EDITING AND SHARING SYSTEM FOR REWRITABLE DISK MEDIA

The inventive arrangements relate generally to methods and apparatus creating and sharing edit points files used to customize video and/or audio digital programs recorded on disk media, for example recordable digital video disks, hard drives and magneto optical disks.

Various devices have been developed to enable consumers to record video and/or audio programs for later presentation. Such devices include tape recorders, video cassette recorders, recordable compact disks, and most recently, recordable digital video disks (DVD). Hard drives and magneto optical disks have also been used.

As of this time no uniform industry standard has been adopted for recordable DVDs. The acronyms DVD-RAM, DVD-RW and DVD+RW are also used generally to refer to the respective rewritable technologies. Reference herein to rewritable DVD technology, devices and methods is generally intended to encompass all of the standards which are now being used, as well as those which may be developed in the future.

Depending upon the standard that is eventually adopted, if any, certain recording schemes used to implement various advanced features will be compatible with all devices adhering to the standard, whereas other recording schemes may prove to be incompatible due to inconsistencies with the standard. Nevertheless, a particular proprietary advanced feature incompatible with other devices can still be very desirable from a consumer's point of view. The result is merely that a recording made in accordance with an incompatible advanced feature cannot be played back on the device of a different manufacturer, even if conventional recordings are fully compatible and portable.

In many cases, the program presentations are recorded in the viewer and/or listener's absence, for presentation at a later, more convenient time. This is referred to as time shifting the program. At other times, a program is being viewed and/or listened to without being recorded, and without any interest in a recording, but the viewer's and/or listener's

attention is interrupted, for example by a telephone call or an unexpected visitor. If the viewer and/or listener is watching a television program, for example, and has a cassette tape in a VCR, or can retrieve and load such a cassette tape quickly, the program can be recorded. However, the viewer and/or listener cannot view and/or listen to the program in its entirety, and in a proper time sequence, until after the recording has been completed. The time to completion of the recording can be short or long, depending on the length of the program.

Although rewritable DVD technology is generally available, operation is limited to such basic functions as play, record, fast forward reverse and stop. Pause is available, but only as a counterpart to pause operation in a VCR, for example interrupting the play back of a prerecorded program or interrupting the recording of a viewed program to eliminate commercials from the recording. Unlike computer hard drives, recordable DVD devices have a very significant additional function, which is playing back prerecorded DVD's. Thus, there is an economic incentive to develop rewritable DVD technology, including methods and devices, that can be used instead of a computer hard drive. It is a challenge to provide such devices with improved, advantageous features without compromising the goal of decreasing costs and increasing sales.

Rewritable DVD technology typically uses MPEG-2 encoders and decoders and many acronyms are encountered that are related to MPEG-2. The DVD standard, for example, calls for the video content of the disk to be divided up into video object units (VOBU's) in which each VOBU contains 0.4 to 1.0 seconds of presentation material. Each VOBU starts off with a navigation pack (NV_PCK or NAV_PACK). The navigation pack contains various navigation information, some of which is very useful for trick modes. The navigation pack includes presentation control information (PCI) and data search information (DSI). One example is the inclusion of the start addresses for many of the nearby VOBU's. This can facilitate jumping to the next VOBU forward or backward, or for a faster trick mode, to the second VOBU forward or backward, or to the third, etc. Another example is the inclusion of the end address for the first three

reference pictures in the VOBU. This is the only clue given as to the structure of the VOBU.

Each video object set (VOBS) includes a plurality of video objects. Each video object includes a plurality of cells. Each cell includes a plurality of VOBU's. Each of the VOBU's contains about 0.4 to 1.0 seconds of presentation material. A typical VOBU in a commercial movie contains 0.5 second of presentation material, corresponding to one group of pictures (GOP). Each VOBU is a sequence of packs in recording order. Each VOBU starts with exactly one navigation pack and encompasses all of following kinds of packs, including a video pack (V_PCK), an audio pack (A_PCK) and a sub-picture pack (SP_PCK).

Data search information (DSI) helps the decoder find reference pictures within the VOBU corresponding to the current Nav_Pack. DSI also helps the decoder to find VOBU's far into the future or past, relative to the current VOBU. The VOBU's in the past relative to the current VOBU presentation are referenced in fields of the Nav_Pack known as the BWDI (backward information). The VOBU's in the future relative to the current VOBU presentation are referenced in fields of the Nav_Pack known as FWDI (forward information). One example is the inclusion of the start addresses for many of the nearby VOBU's, up to +240 VOBU forward and -240 VOBU backward directions. This can facilitate jumping to the next VOBU forward or backward, or for a faster trick mode, to the second VOBU forward or backward, or to the third, etc.

The video, audio, subpicture, presentation control information and data search information are the five kinds of packetized elementary streams (PES).

The various features and characteristics described above make it possible for programs to be recorded, re-recorded or simply played back in an edited form. It is known, for example, that movies on DVD disks can be manufactured such that, as played back, the viewer can select different levels of violence, sexual content and profanity. It is possible, and indeed desirable, that viewers can edit such programs according to their own likes and desires, even when desired criteria do

not correspond to the preprogrammed choices. Moreover, it is desirable that viewers can share their personally edited versions with others having similar tastes or concerns. Simply providing copies of edited programs can raises copyright concerns. There is a need to provide a method for sharing such personally edited programs that is easy to implement and does not raise legal concerns.

In accordance with the inventive arrangements, the problems described above are overcome by methods and apparatus for creating and sharing the personal editing control files, hereinafter referred to as edit points files, making it unnecessary to share the actual programs. Advantageously, edit points files can be transferred between viewers, for example over the Internet, by modem to modem connections, or in the context of a private network including a digital home network. An Internet server, for example, can be advantageously used as a central storage location to which personal edit points files can be uploaded from viewers and from which the personal edit points files can be downloaded by other viewers.

Figure 1 is a block diagram of a rewritable DVD device that can be provided with one or more advance operating features in accordance with the inventive arrangements.

Figure 2 is a diagram useful for illustrating a system for creating, editing, storing and sharing edit points files in accordance with the inventive arrangements.

Figure 3 illustrates a typical Table of edit points files in accordance with the inventive arrangements.

Figure 4 is a flow chart illustrating the steps for creating, editing edit points files and providing a customized program sequence in accordance with the inventive arrangements.

Device 100 for implementing the various advanced operating features in accordance with the inventive arrangements taught herein utilizes rewritable disk medium 102 in accordance with the inventive arrangements is shown in block diagram form in Figure 1. Rewritable disk medium 102 is embodied as a rewritable DVD in the illustrated embodiment. In many instances, as will be noted, the rewritable disk medium can also be, for example, a hard drive or a magneto optical disk

(MOD). An example of a MOD is a minidisk. In many instances, the inventive arrangements are applicable to video or audio or both video and audio.

Device 100 is capable of writing onto and reading from the disk medium, in this example, a rewritable DVD 102. Device 100 comprises mechanical assembly 104, control section 120, video/audio input processing path 140 and video/audio output processing path 170. The allocation of most of the blocks to different sections or paths is self-evident, whereas the allocation of some of the blocks is made for purposes of convenience and is not critical to understanding the operation of the device.

Mechanical assembly 104 comprises motor 106 for spinning DVD 102 and pickup assembly 108 that is adapted to be moved over the spinning disk. A laser on pickup assembly 108 burns spots onto a spiral track on the disk or illuminates spots already burned onto the track for recording and playing back video and/or audio program material. For purposes of understanding the invention, it is irrelevant whether the disk is recordable on one or two sides, or in the event of a double-sided recording, whether the double-sided recording, or subsequent reading from the disk, takes place from the same side of the disk or from both sides. The pickup and the motor are controlled by servo 110. Servo 110 also receives the Playback Signal of data read from the spiral track of disk 102 as a first input. The Playback Signal is also an input to error correction circuit 130, which can be considered part of the control section or part of the video/audio output processing path.

Control section 120 comprises control central processing unit (CPU) 122 and navigation data generation circuit 126. Control CPU 122 supplies a first input signal to navigation data generation circuit 126 and servo 110 supplies a second input signal to navigation data generation circuit 126. The servo can also be considered part of the control section. Navigation data generation circuit 126 supplies a first input signal to multiplexer (MUX) 154, which forms part of video/audio input processing path 140. The output of MUX 154

is an input to error correction coding circuit 128. The output of error correction coding circuit 128 is a recordable input signal supplied to pickup 108, which will be "burned" onto the spiral track of disk 102 by the laser.

Control buffer 132 for viewer activatable functions indicates those functions presently available, namely play, record, reverse, fast forward, pause/play and stop. The pause is a counterpart to pause operation in a VCR, for example manually interrupting the play back of a prerecorded program or interrupting the recording of a viewed program to eliminate commercials from the recording. A separate buffer 136 is provided to receive commands for implementing the creation, uploading and downloading of an edit points files (EPF). Buffers 132 and 136 can be combined.

Video/audio input processing path 140 is a signal processing circuit for converting a conventional television signal, for example NTSC or PAL, into digitized packet data, for example MPEG-1 or MPEG-2, for digital recording by device 100. Input path 140 comprises NTSC decoder 142 and video encoder, for example MPEG-1 or MPEG-2, 144 for video in, and comprises audio analog-to-digital converter (A/D) 146 and audio encoder, for example MPEG-1 or MPEG-2, 148. The digitized signals are combined in multiplexer 150 and stored in record buffer 152 until an entire packet has been constructed. As each packet is constructed, each packet is combined with the output of the navigation data generation circuit in MUX 154 and sent to error correction coding circuit 128. Error correction coding circuit 128 can also be deemed to be part of input path 140.

As a practical matter, the smallest addressable unit on the spiral track of a DVD is an ECC (error correction code) block of 16 sectors, where each sector includes 2048 bytes of user data. A group is an integer number of EEC blocks, for example 12. Each group of blocks represents approximately 0.5 seconds of combined video and audio program material. The amount of linear space along the spiral track needed to record a group of EEC blocks, for example 192 sectors, is defined herein as a segment of the spiral track. One segment of data

can correspond, for example, to approximately 0.5 seconds of audio and video program material.

Output processing path 170 comprises track buffer, or output buffer, 172, in which data read from the disk is assembled into packets for further processing. The packets are processed by conditional access circuit 174 that controls propagation of the packets through demultiplexer 176 and into respective paths for video and audio processing.

The video is decoded by decoder 178, for example from MPEG-1 or MPEG-2, and encoded as a conventional television signal, for example NTSC or PAL. The audio is decoded by circuit 182, for example from MPEG-1 or MPEG-2, and converted to analog form by audio digital-to-analog (D/A) converter 184. Output processing path 170 can be deemed to include error correction circuit 130, as noted.

Each nearly circular, radially concentric section of the spiral is sometimes referred to as a track, but this terminology is not commonly accepted as having that specific meaning. In CD-ROM's, for example, the term track is also used to refer to that portion of the spiral track that contains a single audio song, or other selection, and the same may or may not become common for DVD's.

It will be appreciated that the advanced features taught herein are applicable to other kinds of disk media and disk media players and recorders.

In the present invention, DVD movies and digital audio data can be seamlessly cut, pasted and displayed in a form determined by user preference using edit point files. The edit point files control device 100 to, for example, turn on/off video, audio and subpictures, and jump to various points in the program sequence. Furthermore, the edit information can be stored in remote computers, storage devices and DVD players and transferred to a particular DVD player through digital communication.

Fig. 2 illustrates system 200 for creating and sharing edit point files for customizing playback of video/audio programs stored on disk 102. System 200 includes a plurality of devices 100 coupled to respective PCs 202, which are in turn

coupled to remote device 208. The devices may be coupled to each other using any one of a plurality of communication interfaces known to those skilled in the art, including, but not limited to firewire, RS232, USB, or IRDa.

PCs 202 perform various control and interfacing functions between devices 100 and remote device 208 including, requesting, storing, displaying, processing, and transferring the edit point files. The local table of edit points stored in PC 202 is illustrated in Fig. 3, wherein the table identifies each stored program, comprising a particular edit point file, and its corresponding address location. PCs 202 may also be used to generate and edit the edit point files. Although the present embodiment includes separate PCs 202, it is to be understood that the functions performed by PCs 202 may be incorporated into devices 100 by including the necessary communications and processing elements into devices 100.

Remote device 208 comprises any one of a plurality of devices or systems that can be coupled to device 100 via digital communication and used to receive, store and transfer edit point files therebetween. In the present embodiment, remote device 208 comprises a server coupled to PCs 202 via the internet, whereby the edit point files can be made publicly accessible and easily transferable between remote device 208 and devices 100. Remote device 208 may also comprise a server connected via a private network, including a digital home network.

The edit point files are stored in memory 190 of each device 100 and are used to customize the playback of programs on disk 102 according to user preference. A user may create an edit point file by providing edit point queues at the desired points of the program. Edit selections can be made using a remote control device having editing keys, such as video/audio/subpicture edit keys, included thereon, or using an OSD menu provided by device 100. An edit summary with thumbnail sketches of edit entry points may be displayed on a television display. Device 100 receives edit point queues from player controls and/or remote and generates an edit point file in response in accordance with software stored therein.

The table below outlines a sample edit point data format for generating the customized playback sequence.

Material Index	Type of Edit	Address
I1	T1	A1
I2	T2	A2
I3	T3	A3
I4	T4	A4

The type of edit refers to the nature of the edit, for example, a video edit start, which may correspond to a blank screen or a freeze, a video edit stop, an audio edit start, or an audio edit stop. The material index corresponds to the reference point in the material where the edit begins or ends. Such a reference point could be a time reference to material play, i.e., title:hours:minutes:seconds:fraction of seconds, or MPEG header numbers, or any other means of referencing the sequence of visual and/or audio material. The address corresponds to the location in memory where these array points are stored.

Control CPU 122 executes a create edit point file routine stored in memory 134 to generate the desired edit point file. The edits may be stored in link lists in the memory and associated to the title of the movie. The edit point files are stored in a non-volatile storage media and indexed to the program title so a user will have the option of using the previously stored edit point files during subsequent playback of the program. When a user places a disc in a device 100, device 100 reads the title and asks whether the user would like to use an existing edit point file. As the movie or audio disc is playing the user can update or enter new edit points into device 100. Advantageously, Windows CE may be introduced into device 100 such that these edit capabilities can be integrated into a Windows application. This application will use standard desktop video editing techniques to achieve the edited product. At all times this editing is carried out through the DIVX and CSS decryption so that the content is never in the clear.

Additionally, the edit point files may be locked with a password so that the edit point files will be automatically used, or not used, during subsequent playback of the program. Once the edit point file is in place and the user has made the

appropriate selections, the presentation of the program will occur omitting the video, audio, and/or subpictures as specified by the edit point files. Edit points in the edit point files can be removed individually or globally.

The edit points can be transferred from one device 100 to another using various communication interfaces, including fire wire, RS232, USB, IRda or modems. These communication interfaces can also be used to connect device 100 to PCs 202, as well as remote device 208, that will streamline the editing process and the saving and downloading of edit points. As shown in Fig. 2, a remote table of edit point files may be kept on remote device 208 on the internet. When the user is interested, he can download the desire edit point files to his home PC 202 and then, via RS232 or some other prearranged communications protocol, to device 100. Similarly, the user may create and upload an edit point file from device 100 to remote device 208, via PC 202. In this regard, control CPU 122 executes a download/upload EPF routine stored in memory 134 in response to a download/upload request from the user.

In the present embodiment, the editing information necessary to generate a customized playback is transferred to and stored in a memory device of device 100. Once the editing information has been transferred, device 100 monitors the playback status and generates the necessary editing commands to seamlessly provide a customized playback sequence without further commands from home PC 202 or remote device 208.

In an alternative embodiment, the editing information may be transferred to home PC 202, wherein home PC 202 monitors the playback status and sends the required commands, during appropriate moments of the playback, to provide the customized playback. In such a case, home PC 202 keeps track of real time via the RS232 port and when PC 202 notes that an edit point is coming up, PC 202 sends a command to attached device 100 to perform the required editing step, such as seamlessly jumping to the next edit point. Again, the functions of PC 202 may be incorporated into device 100, such that the real time monitoring of playback and issuance of editing commands may be performed directly between device 100 and remote device 208.

It can be seen that by using the present invention, new edit files may be devised and made publicly accessible by a many different entities, including, individual consumers, an organization that previews and provides the edits as a service, a bulletin board participant, or an employee of a web-based service.

Fig. 4 is a flowchart illustrating the control of device 100 in creating an edit point file and playing back a program in accordance with an edit point file. In step 306, device 100 determines whether the user has selected a play mode or an edit mode. If in the edit mode, device 100 reads the time of the program playback sequence in step 308. In step 310, device 100 reads the edit status to determine whether the user has selected an edit command, such as by pressing a video/audio/subpicture edit key or changing the edit mode. In step 312, if the user has selected a mode change, method 300 returns to step 306. If the user has not selected an edit point or a mode change, method 300 goes to step 316 to wait for a 200ms timer to elapse, and then returns to step 308. If the user has selected an edit point, method 300 goes to step 314 and stores the information associated with the edit point into the edit point file. The edit information includes: the edit status, i.e., audio start/stop, video start/stop, subpicture start/stop, and audio and video start/stop; track; hour; minute; and second. Once the edit information is stored, method 300 waits for the 200 ms timer to elapse and continues by returning to step 308.

If the play mode is selected in step 304, method 300 goes to step 318, wherein the array pointer is set to a first edit point entry. In step 320, device 100 reads the current playback information including title, hour, minute and second. In step 322, device 100 compares the current playback information with the first edit point entry. If the current playback information is not past the first array pointer entry, method 300 determines in step 324 whether the current playback information is past the pointer entry that immediately precedes the first array pointer entry. If not, the array pointer is decremented by one in step 328, and method 300 returns to step

322. If so, method 300 goes to step 346 without making any changes to the array pointer.

If the current playback information is past the first array pointer entry as determined in step 322, method 300 goes to step 330 to determine whether the current playback information is past the pointer entry immediately following the first array pointer entry. If not, method 300 increments the array pointer by one in step 326 and returns to step 322. If so, method 300 checks the edit type specified in step 332, and then performs the particular one of the edit steps 334, 336, and 338 as required. If an end edit command is specified, method 300 determines the current edits that should be ended. Here, method 300 turns off the mute, resumes the video, or resumes the subpictures as required in step 342.

At this point, method 300 decrements the array pointer by one in step 344 and waits for the 200 ms timer to elapse in step 346. In step 348, device 100 checks the edit status to determine whether the user has requested a change in the operating mode. In step 350, method 300 goes to step 306 if the user has selected the edit mode. If the play mode is maintained, method 300 reads the current playback information in step 320 and repeats the steps for turning on/off the edits as described above.

It will be apparent to those skilled in the art that although the present invention has been described in terms of an exemplary embodiment, modifications and changes may be made to the disclosed embodiment without departing from the essence of the invention. For example, the edit file may be created, and shared to remove commercials in recordable devices. Therefore, it is to be understood that the present invention is intended to cover all modifications as would fall within the true scope and spirit of the present invention.

CLAIMS

1. A method for presenting digital video data, comprising the steps of:

receiving digital video data from a first data storage medium; and

displaying a program included in the digital video data in accordance with editing information associated with the program, characterized by

requesting and receiving, from a publicly accessible storage medium, edit information associated with the program, and

processing the digital video data in accordance with the edit information to thereby display an edited program sequence.

2. The method according to claim 1, further characterized by the step of

storing the edit information in a second data storage medium that is coupled to a means for processing the digital video data.

3. The method according to claim 2, characterized in that the storing step comprises storing the edit information in a non-volatile storage medium, and further characterized by the step of

determining whether a user selected program has associated edit information stored in the non-volatile storage medium, and if so, automatically processing the user selected program in accordance with the associated edit information stored on the non-volatile storage medium.

4. The method according to claim 3, further characterized by the step of

allowing the user to override the automatic processing by entering a password.

5. The method according to claim 4, further characterized by the steps of

displaying the associated edit information in a user viewable form, and

allowing the user to select portions of the associated edit information to be used during playback of the digital video data.

6. The method according to claim 2, further characterized by the steps of

transmitting playback position information to the publicly accessible storage medium as the digital video data is being processed, and

receiving and storing edit information transmitted by the publicly accessible storage medium in response to the transmitted playback position information.

7. The method according to claim 1, further characterized by the steps of

displaying a plurality of edit information sets associated with the program and available from the publicly accessible storage medium, and

requesting a user selected ones of the plurality of edit information sets from the publicly accessible storage medium.

8. The method according to claim 1, further characterized by the steps of

displaying the edit information in a user viewable form, and allowing the user to select portions of the edit information to be used during processing of the digital video data.

9. The method according to claim 1, further characterized by the steps of

receiving user entered edit information, and

transmitting the user entered edit information to the publicly accessible storage medium.

10. The method according to claim 1, characterized in that the publicly accessible storage medium comprises a server connected to the internet.

11. The method according to claim 1, characterized in that the edit information includes one of blank video command, audio mute command, blank subpicture command, and jump in time command.

12. The method according to claim 1, characterized in that the step of receiving the edit information comprises receiving the edit information via one of firewire, RS232, USB and IRda.

13. A method for presenting digital video data stored on a first data storage medium that is coupled to a private network, including a digital home network, comprising the steps of:

receiving digital video data from the first data storage medium; and

displaying a program included in the digital video data in accordance with editing information associated with the program, characterized by

requesting, from a second storage medium that is also coupled to the private network, edit information associated with the digital video data;

receiving and storing the edit information in a third storage medium; and

processing the digital video data in accordance with the edit information stored in the third storage medium to provide a program output.

14. The method according to claim 13, further characterized by the steps of

displaying a plurality of edit information available from the second storage medium,

receiving a user selection of one of the plurality of edit information, and

requesting the user selection from the second storage medium.

15. The method according to claim 13, further characterized by the steps of

displaying the edit information in a user viewable form, and allowing the user to select portions of the edit information to be used during processing of the digital video data.

16. The method according to claim 13, characterized in that the receiving and storing step comprises storing the edit information in a non-volatile storage medium, and further characterized by the step of:

determining whether a user selected digital video data has associated edit information stored in the non-volatile storage medium, and if so, automatically processing the user selected digital video data in accordance with the associated edit information stored on the non-volatile storage medium.

17. The method according to claim 13, further characterized by the steps of

receiving user entered edit information, and

transmitting the user entered edit information to the second storage medium.

18. The method according to claim 13, further characterized by the steps of transmitting playback position information to the second storage medium as the digital video data is being processed, and receiving and storing edit information transmitted by the second storage medium in response to the transmitted playback position information.

19. The method according to claim 13, characterized in that the step of receiving the edit information comprises receiving the edit information via one of firewire, RS232, USB and IRda.

20. A method for managing at a publicly accessible site editorial information related to digital video and/or audio programs, comprising the steps of:

receiving a user transmitted file request; and

transmitting the requested file, characterized by

receiving from at least one remote site an edit points file containing editorial information related to any digital video and/or audio program edited at the at least one remote site;

storing the edit points file at the publicly accessible site;

enabling remote access to the stored indexed edit points file from any other remote site; and,

transmitting the edit points file to the any other remote site responsive to a request from the remote sites.

21. The method of claim 20, further characterized by the steps of:

receiving a plurality of said edit points files from a plurality of the remote sites;

storing all of the edit points files;

indexing the stored edit points files;

enabling remote access to all of the stored indexed edit points files; and,

transmitting requested ones of the edit points files to different ones of the remote sites.

22. The method of claim 21, further characterized by the step of

storing for each of the edit points files a corresponding program title and editing strategy.

23. The method of claim 22, further characterized by the step of

managing the publicly accessible site from an internet server.

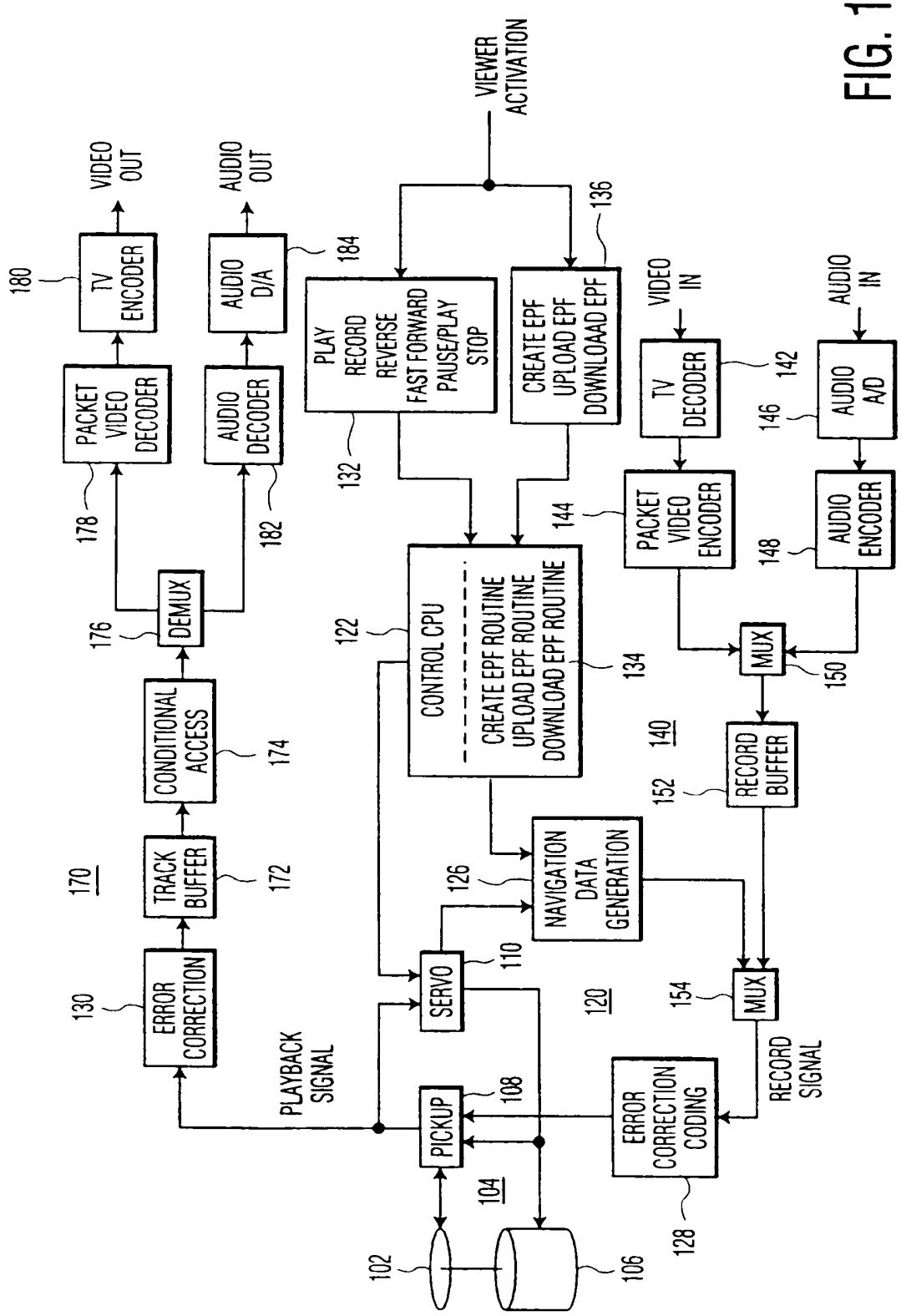
VIEWER ACTIVATION
VIDEO OUT
AUDIO OUT
VIDEO IN
AUDIO IN
TV ENCODER
AUDIO D/A
PLAY RECORD REVERSE FAST FORWARD PAUSE/PLAY STOP
CREATE EPF UPLOAD EPF DOWNLOAAD EPF
TV DECODER
AUDIO A/D
PACKET VIDEO DECODER
AUDIO DECODER
PACKET VIDEO ENCODER
AUDIO ENCODER
CONTROL CPU
CREATE EPF ROUTINE UPLOAD EPF ROUTINE DOWNLOAD EPF ROUTINE
DEMUX
MUX
CONDITIONAL ACCESS
RECORD BUFFER
TRACK BUFFER
NAVIGATION DATA GENERATION
ERROR CORRECTION
SERVO
MUX
PLAYBACK SIGNAL
PICKUP
ERROR CORRECTION CODING
RECORD SIGNAL
180
184
136
132
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FIG. 1

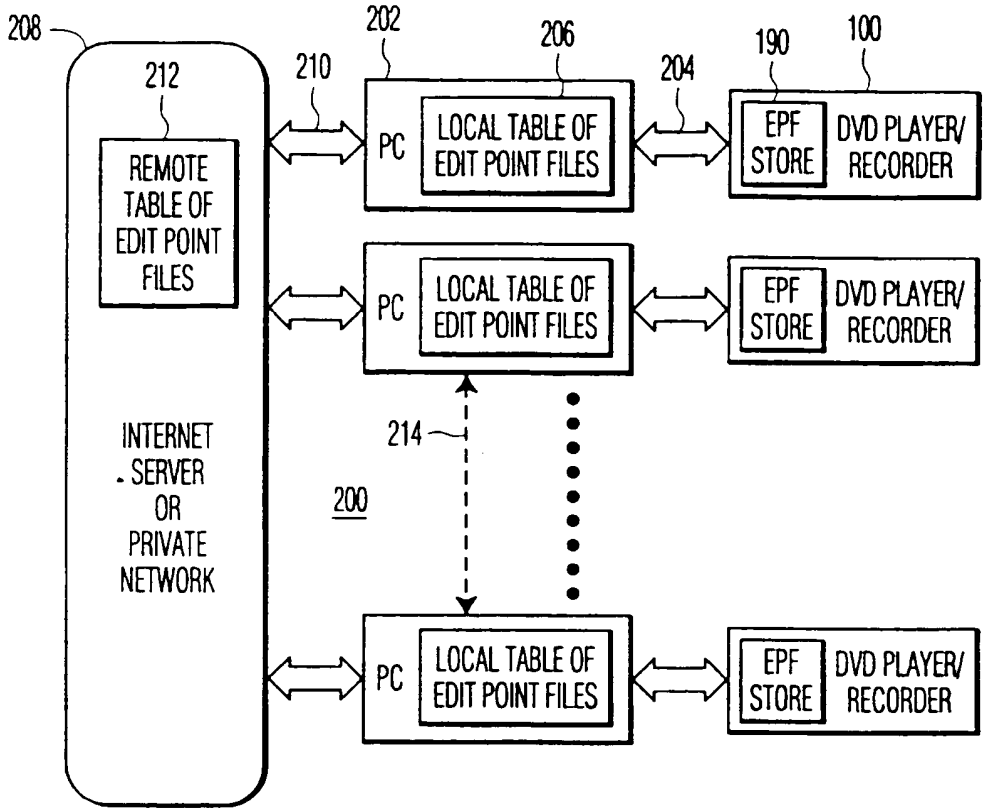

FIG. 2

TABLE OF EDIT POINT FILES	206, 212
PROGRAM	ADDRESS
P1	A1
P2	A2
P3	A3
P4	A4
P5	A5
•	•
•	•
•	•
•	•

FIG. 3

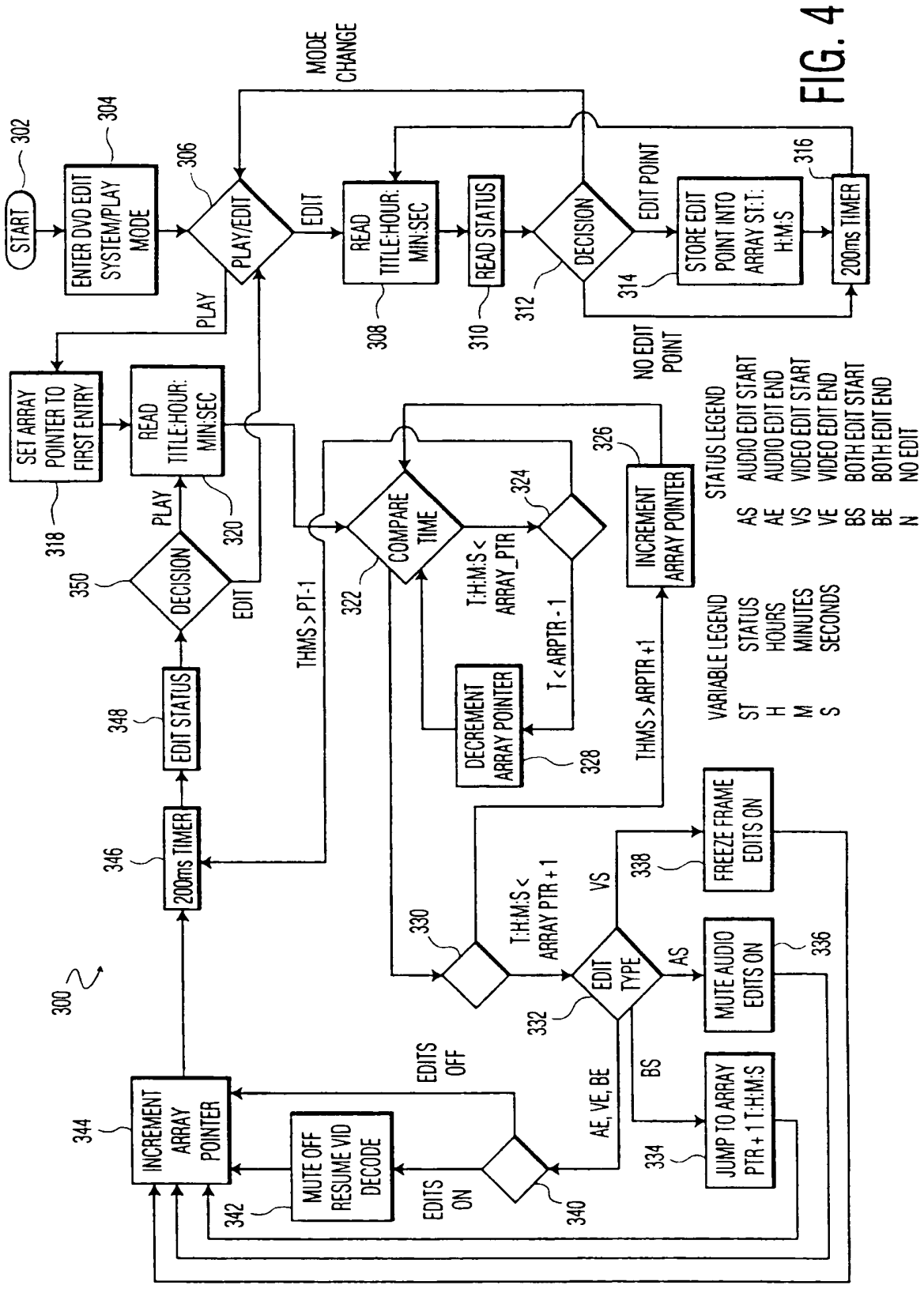
START
302
ENTER DVD EDIT SYSTEM/PLAY MODE
304
PLAY/EDIT
306
MODE CHANGE
EDIT
READ TITLE:HOUR: MIN:SEC
308
READ STATUS
310
DECISION
312
EDIT POINT
STORE EDIT POINT INTO ARRAY ST:T: H:M:S
314
200ms TIMER
316
NO EDIT POINT
PLAY
SET ARRAY POINTER TO FIRST ENTRY
318
READ TITLE:HOUR: MIN:SEC
320
DECISION
350
PLAY
EDIT
COMPARE TIME
322
T:H:M:S < ARRAY_PTR
324
INCREMENT ARRAY POINTER
326
THMS > PT-1
T < ARPTR - 1
DECREMENT ARRAY POINTER
328
THMS > ARPTR +1
EDIT STATUS
348
200ms TIMER
346
T:H:M:S < ARRAY PTR + 1
330
EDIT TYPE
332
VS
FREEZE FRAME EDITS ON
338
AS
MUTE AUDIO EDITS ON
336
BS
JUMP TO ARRAY PTR + 1 T:H:M:S
334
AE, VE, BE
EDITS OFF
EDITS ON
340
MUTE OFF RESUME VID DECODE
342
INCREMENT ARRAY POINTER
344
300
STATUS LEGEND
AS AUDIO EDIT START
AE AUDIO EDIT END
VS VIDEO EDIT START
VE VIDEO EDIT END
BS BOTH EDIT START
BE BOTH EDIT END
N NO EDIT
VARIABLE LEGEND
ST STATUS
H HOURS
M MINUTES
S SECONDS

FIG. 4

INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/US 00/30725

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G11B27/00 G11B27/10 G11B19/02 G11B27/11 G06F17/30
H04N7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G11B H04N H04H G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	EP 0 450 841 A (GTE LABORATORIES INC) 9 October 1991 (1991-10-09) column 4, line 11 - line 16	1-3,6,9
Y		4,5,7,8, 10
A		13, 16-18,20
Y	WO 98 25269 A (THOMSON CONSUMER ELECTRONICS) 11 June 1998 (1998-06-11) the whole document	10
A		1-9, 11-20

-/—

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 February 2001	06/03/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Daalmans, F

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INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/US 00/30725

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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PCT/US 00/30725

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